UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

Memorandum

Subject: Coumaphos Dietary Exposure.
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A preliminary Tolerance Assessment System (TAS) analysis on coumaphos was run using tolerance levels for eggs, milk fat, and for the meat, fat and meat by-products of cattle, goats, hogs, horses, poultry and sheep (see Albin B. Kocialski, Ph.D., 4/12/89). As a result of unacceptable risks calculated using tolerances, DEB has been asked to determine anticipated residues for coumaphos on these commodities.

Tolerances are established for the combined residues of coumaphos (O,O-diethyl O-3-chloro-4-methyl-2-oxo-2H-1-benzopyran-7-yl phosphorothioate) and its oxygen analog (O,O-diethyl O-3-chloro-4-methyl-2-oxo-2H-1-benzopyran-2-yl phosphate) as follows (40 CFR 180.189):

Commodity	Tolerance
Eggs	0.1 ppm
Milk fat	0.5 ppm (reflecting negligible residues in milk)
Meat, fat and meat by-products of cattle, goats, hogs, horses, poultry and sheep	1.0 ppm

Table 1 summarizes the registered insecticidal uses of coumaphos which could result in residues in animal commodities. No uses on plants are currently registered.

Table 1: Summary of Maximum Application Rates for Coumaphos on Animals

Animal	Type of Application	Max. App. Rate	Number of Applications
Beef and non-lactating dairy cattle (14-day pre-freshening interval included for all non-lactating dairy cattle)	Spray to run-off	4.0 lbs. a.i. / 100 gal (0.5%)	Repeat as needed
	Dip	2.5 lbs. a.i. / 100 gal	2 apps., 14 days apart
		1.0 lbs. a.i. / 100 gal	repeat as needed
	Back-rubber	1.2 ozs. a.i./gal oil	No limit
	Dust	0.02 ozs. a.i./animal	No limit
	Spot	-	No limit
Dairy cattle	Spray	0.25 lbs. a.i./100 gal (0.03%)	No limit
	Back-rubber	1.2 ozs. a.i./gal oil	No limit
	Spot	-	No limit
	Dust	0.02 ozs. a.i./animal	No limit
Goats (14-day pre-freshening interval)	Spray or Dip	2.0 lbs. a.i./100 gal (0.25%)	No limit
Hogs	Spray	2.0 lbs. a.i./100 gal (0.25%)	Repeat as needed, 10 day interval
	Dust	0.01 ozs. a.i./animal	No limit
	Spot	-	No limit
Horses	Spray	2.1 lbs. a.i./100 gal (0.26%)	

(continued)

Table 1: Summary of Maximum Application Rates for Coumaphos on Animals (continued)

Animal	Type of Application	Max. App. Rate	Number of Applications
Horses (continued)	Dip	2.1 lbs. a.i./100 gal (0.26%)	No limit
	Dip	2.5 lbs. a.i./100 gal (0.31%)	2 apps., 10-14 days apart
	Spot	-	No limit
Sheep (15-day PSI)	Spray or dip	2.0 lbs. a.i./100 gal (0.25%)	No limit
	Spot	-	No limit
Poultry (chickens, ducks, geese and turkeys)	Spray or dust	0.003 ozs. a.i./bird	7-day interval
	Poultry houses or litter area	0.12 ozs. a.i./100 ft^2	No limit

The metabolism of coumaphos is not considered adequately understood (see Coumaphos Second Round Review (SRR), Residue Chemistry, 2/1/89). For the purposes of this dietary exposure assessment, we will consider the total toxic residue to include coumaphos and its oxygen analog as described in the tolerance expression.

The available residue data for coumaphos applications to animals were generated over a long period of time using several analytical methods . The current enforcement method for milk and animal tissues has undergone a successful method trial and is included in PAM II (Method 1). A GLC method is available for determination of residues of coumaphos and its oxygen analog in eggs. Variations of these methods were used to generate most of the available residue data. Analytical method limits of detection for combined residues of coumaphos and its oxygen analog ranged from 0.02 - 0.1 ppm for meat and fat, 0.004 - 0.02 ppm for milk, and 0.02 ppm for eggs.

Residue data are available reflecting applications to animals in the form of dips, sprays, dust and dust bag applications, and

backline applications for cattle, goats, hogs, sheep, chickens, milk and eggs. Animal tissues analyzed include muscle, heart, liver, kidney, brain, skin, various types of fat, and chicken "giblets". Formulations used include 25WP, 4% Pour-On, as well as EC and dust formulations (see PP#1F0306, PP#7F0612, PP#0299, PP#8F0678, MRID Nos. 11556-3, -4, -11, -16, -19, -21, -25, 3125-124).

Most of the residue data for coumaphos were generated prior to 1968. Since there are several registered types of applications (dust, dust bag, dips, sprays), and ranges of application rates, these data were generated to represent many of these types and rates of applications for various animals. Additionally, many exaggerated rate studies are available. Residue levels measured in these studies are frequently not consistent from study to study even when similar types and rates of applications were utilized. Furthermore, information regarding typical rates of application, application rates, and pre-slaughter intervals is not available. Because of these limitations in the data base, simple calculations of average and upper-bound residue levels were not possible.

Rather, a residue decline analysis was performed for each study, if appropriate, to calculate average and 95% confidence limit values between zero and 14 days after treatment. Other studies showed only non-detectable residues. The highest average values between zero and 14 days for each study were used to calculate an average which is shown in Table 2 in the column titled "average". Also, the highest 95% confidence limit (or highest residue level found) between zero and 14 days was determined for each study, and the highest of these from all studies was used for the "upper-bound" value in Table 2. In calculating both of these values, average and upper-bound, high values which appeared to be "outliers" were excluded from the data sets if the values appeared unrealistically high because the data sets were small or because the value was obtained by extrapolation to higher or lower PHIs for which residue data were not available.

Average values shown in Table 2 should be used to calculate chronic exposure, and upper-bound values should be used to calculate acute exposure. The commodities shown correspond to food forms found in the Tolerance Assessment System (TAS).

A wide range of residues were found in beef fat. Therefore, in order to estimate anticipated residues for chronic risk assessment for beef fat, residue data were weighted by the approximate percent of each type of application made to beef cattle based on the best available data (approximately 60% dust, 40% spray or dip; taken from the minutes of a Coumaphos team meeting dated 5/6/81).

Table 2: Anticipated Residues for Coumaphos for Use in Calculating Chronic and Acute Exposure

Commodity	Anticipated Residue (ppm) Average	Upper Bound
Beef (and horse), lean meat without removable fat	0.03	0.05
, fat	0.15	0.40
, liver (and meat by-products)	0.10	0.10
, kidney	0.04	0.04
Goat, lean meat without removable fat	0.04	0.20
, fat	0.50	1.0
, liver (and meat by-products)	0.03	0.03
, kidney	0.02	0.03
Hog, lean meat	0.03	0.20
, fat	0.06	0.60
, liver (and meat by-products)	0.02	0.02
, kidney	0.02	0.02
Sheep, lean meat without removable fat	0.05	0.25
, fat	0.50	1.0
, liver (and meat by-products)	0.03	0.08
, kidney	0.04	0.09
Poultry, meat	0.06	0.60
, giblets	0.01	0.03
Eggs	0.02	0.08
Milk	0.006	0.02

Conclusions and Recommendations

We conclude that the anticipated residues listed above are appropriate for use in dietary exposure assessments for coumaphos. These values reflect those expected from chronic (based on average residues) and acute (based on highest residue found or 95% confidence limit) exposure based on available studies for direct dermal animal treatments with coumaphos. We note that these levels could be reduced upon cooking; however, cooking studies are not available for coumaphos in DEB files.

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